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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/470,236	11/15/1999	ANDREW D. BAILEY III	LAM1P123/P05	5922

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 12/05/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/470,236

Applicant(s)

BAILEY ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/12/02 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 24.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11-4-02 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "said substantially cylindrical plasma processing" in lines 6-7. There is insufficient antecedent basis for this limitation in the claim. It appears that the proper phrase is --said substantially cylindrical plasma processing chamber--.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-5, 7-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Li et al., U.S. Patent 6,070,551.

Li et al. shows the invention as claimed including a plasma processing system, said plasma processing system comprising: a substantially cylindrical plasma processing chamber 6 used to process a substrate 42, said substantially cylindrical plasma processing chamber including a top region 76 located on the top surface of said substantially cylindrical plasma processing chamber, an upper peripheral region (the region around gas nozzle 34a), and a lower peripheral region (the region around gas nozzle 34) located on a surface surrounding the periphery of said substantially cylindrical plasma processing chamber; a gas flow system operated by a processor (see col. 4-lines 59-65) and coupled to said plasma processing chamber, said gas flow system using controllers (37a,37,60) to control the flow of input gas into at least two different regions of said plasma processing chamber; wherein said at least two different regions include a lower peripheral region and a top region of the chamber and the

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peripheral region is not part of the top region (see Fig. 3 and col. 4-line 33 to col. 5-line 63).

Furthermore, concerning the input gas being a source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus.

Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Li et al. is capable of using a source gas that is suitable for etching the substrate in the plasma processing chamber.

With respect to claims 10-11, note that Li et al. suggests the replacement of the gas injectors of Fig. 1 with gas rings (see col. 8-lines 7-22).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 6,070,551 in view of Wing et al., U.S. Patent 6,277,235.

Li et al. is applied as above but fails to expressly disclose where the process gas that is flowed through the lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Claims 1-2 and 7-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al., U.S. Patent 6,228,781.

Murugesh et al. shows the invention substantially as claimed including a plasma processing system 10 comprising: a plasma processing chamber used to process a substrate 17, said processing chamber including a top region 46 located on the top

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surface of said plasma processing chamber and an upper peripheral region (the region around gas nozzles 38,40) located on a surface surrounding the periphery of said plasma processing chamber; a gas flow system coupled to said plasma processing chamber (for example, 35A, 35A', 35B, 35B'), said gas flow system controlling flow of input gas into at least two different regions of said plasma processing chamber, wherein said at least two different regions include at least one peripheral region and at least one top region of said plasma processing chamber; and the peripheral region does not include any point of the top region (see figs. 1A-1D and col. 4-line 44 to col. 8-line 10).

Murugesh et al. fails to expressly disclose a cylindrical processing chamber. However, regarding the shape of the chamber, such configuration is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed coil is significant, see *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Concerning the input gas being a source gas suitable for use to etch said substrate in said plasma processing chamber, since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. Furthermore, the particular use for the source gas is viewed as an intended use that does not further limit, and therefore does not patentably distinguish the claimed invention. The apparatus of Murugesh et al. is capable of having a source gas that is suitable for etching the substrate in the plasma processing chamber.

Additionally, concerning claims 10-11, note that the upper peripheral region of Murugesh et al. contains gas rings 37.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murugesh et al., U.S. Patent 6,228,781 in view of Wing et al., U.S. Patent 6,277,235.

Murugesh et al. is applied as above but fails to expressly disclose where the process gas that is flowed through the lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Murugesh et al. so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Claims 19-35, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al., U.S. Patent 5,810,932 in view of Kadomura, U.S. Patent 6,096,160 and further in view of Li et al., U.S. Patent 6,070,551.

Ueda et al. shows the invention substantially as claimed including a chamber 15 which is in the shape of a cylinder in which plasma is generated; a coupling window 11 disposed at an upper end of the chamber; an RF antenna 12 disposed above a plane defined by the substrate; and an electromagnet arrangement 14 proximate the antenna (see Figure 7 and its description).

Ueda et al. fails to expressly disclose a controller to vary the magnitude of the magnetic field or the gas flow system as claimed. Kadomura discloses a magnet arrangement 53 whereby a d.c. power supply 68 is coupled to the magnets and is varied in a controlled manner (see abstract) in order to better control the plasma. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. so as to include the controller of Ueda et al. because such a control system allows for better controllability of the plasma system.

Regarding the gas flow system, Li et al. shows a gas flow system operated by a processor (see col. 4-lines 59-65) and coupled to said plasma processing chamber, said gas flow system using controllers (37a, 37, 60) to control the flow of input gas into at least two different regions of said plasma processing chamber; wherein said at least two different regions include a lower peripheral region, an upper peripheral region, and a top region of the chamber and the peripheral region is not part of the top region (see Fig. 3 and col. 4-line 33 to col. 5-line 63). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. modified by Kadomura so as to incorporate the gas flow system of Li et al. because this will allow for more uniform gas distribution throughout the chamber. Furthermore, note that Li et al. suggests the replacement of the gas injectors of Fig. 1 with gas rings (see col. 8-lines 7-22).

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al., U.S. Patent 5,810,932 in view of Kadomura, U.S. Patent 6,096,160 and further in view of Li et al., U.S. Patent 6,070,551, as applied to claims 19-35, and 37 above, and further in view of Wing et al., U.S. Patent 6,277,235.

Ueda et al., Kadomura, and Li et al. are applied as above but fail to expressly disclose where the process gas that is flowed through the lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. modified by Kadomura and Li et al. so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Claims 19-20, 23-30, 32-34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al., U.S. Patent 5,810,932 in view of Kadomura, U.S. Patent 6,096,160 and further in view of Murugesh et al., U.S. Patent 6,228,781.

Ueda et al. shows the invention substantially as claimed including a chamber 15 which is in the shape of a cylinder in which plasma is generated; a coupling window 11 disposed at an upper end of the chamber; an RF antenna 12 disposed above a plane defined by the substrate; and an electromagnet arrangement 14 proximate the antenna (see Figure 7 and its description).

Ueda et al. fails to expressly disclose a controller to vary the magnitude of the magnetic field or the gas flow system as claimed. Kadomura discloses a magnet arrangement 53 whereby a d.c. power supply 68 is coupled to the magnets and is varied in a controlled manner (see abstract) in order to better control the plasma. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. so as to include the controller of Ueda et al. because such a control system allows for better controllability of the plasma system.

Regarding the gas flow system, Murugesh et al. discloses a gas flow system coupled to said plasma processing chamber (for example, 35A, 35A', 35B, 35B'), said gas flow system controlling flow of input gas into at least two different regions of said plasma processing chamber, wherein said at least two different regions include at least one peripheral region and at least one top region of said plasma processing chamber; and the peripheral region does not include any point of the top region (see figs. 1A-1D and col. 4-line 44 to col. 8-line 10). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. modified by Kadomura so as to incorporate the gas flow system of Murugesh et al. because this allows for more uniform distribution of process gas throughout the chamber. Additionally, note that the upper peripheral region of Murugesh et al. contains gas rings 37.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al., U.S. Patent 5,810,932 in view of Kadomura, U.S. Patent 6,096,160 and further in view of Murugesh et al., U.S. Patent 6,228,781 as applied to claims 19-20, 23-30, 32-34 and 37 above, and further in view of Wing et al., U.S. Patent 6,277,235.

Ueda et al., Kadomura, and Murugesh et al. are applied as above but fail to expressly disclose where the process gas that is flowed through the lower region of the chamber is flown through a chuck supporting a wafer. Wing et al. discloses flowing input gas through a chuck supporting a wafer (see fig. 1 and col. 3-line 19 to col. 4-line 22). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Ueda et al. modified by Kadomura and Murugesh et al. so as to flow input gas through the chuck as disclosed by Wing et al. because Wing et al. shows this as a suitable method to flow gas into a processing chamber.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Luz L. Alejandro
Patent Examiner
Art Unit 1763

December 2, 2002